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Monetary Policy

Money Talks — Let's Listen!

by

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and

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Canada is in the midst of a major monetary policy experiment. Within the mainstream of Canadian economic analysis, it is possible to discern two distinct views about its likely outcome.

One, a *structural-eclectic* view, sees a protracted recession — barring large further declines in interest rates — and significant "cost-push" inflation, stemming from the GST, oil prices, and wage pressure. The other, a *monetarist* view, sees signs that the recession may be short, and, more important, anticipates a substantial decline in inflation — perhaps down to 2 percent by the end of 1992 — as a result of the slower rates of money growth that have prevailed since 1989.

The two positions differ mainly in their views about the significance of the behavior of various measures of money. The structural-eclectic position argues that the monetary aggregates respond passively to changes in money demand and therefore have little significance for future output and inflation. The monetarist position allows also for supply-side factors related to lending activity. These factors may cause money supply and money demand to differ, making the behavior of the aggregates highly significant for the economy's future prospects.

An analysis of bank lending patterns and changes in the monetary aggregates in Canada lends some support to the monetarist view that the behavior of money is important. This suggests that Canadians may, on average, be too gloomy about the prospects for growth and inflation over the next two years.

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Introduction

The Canadian economy is in the midst of a major monetary policy experiment. In the course of the Bank of Canada's controversial — though in our view commendable — fight against inflation, various views of the influence of monetary policy on economic activity and inflation are being put to the test.

A Difference of Views

Within the mainstream of economic analysis, it is possible to discern two rather different views of Canada's current situation, which carry strikingly different implications for the economic outlook over the next year or two.

One line of thought — which might be termed a *structural-eclectic* view — has it that inflation originates from a variety of sources, such as wage pressure, import prices, taxes, and assorted structural features of the economy. This view accords monetary policy some role in fighting inflation by slowing growth of output relative to capacity through high interest rates and a high exchange rate. However, it downplays the significance of money growth as an indicator of monetary conditions, viewing the behavior of various measures of money as largely passive responses to fluctuations in output, prices, and interest rates.

Another line of thought — which might be termed the *monetarist* view — holds that inflation is fundamentally a result of the supply of money running ahead of the demand for it. To this way of thinking, money growth — and the central bank's control of it — has a special role in fighting inflation.

Each of these views seems compatible with the facts of Canada's current situation: short-term interest rates and the Canadian dollar remain high; the economy is in recession, with key indicators of spending, production, and employment declining; and growth of money and credit slowed dramatically last year, in some cases turning negative. But the two views point in different directions when it comes to the timing of the recovery and, more particularly, when it comes to the outlook for inflation over the next two years.[1]

Contrasting Expectations

The structural-eclectic view foresees a protracted recession, barring sharp declines in interest rates and the dollar, and significant "cost-push" inflation of some 6-percent-plus this year and 4-percent-plus in 1992.

The monetarist view, by contrast, sees indications that the recession may be of shorter duration, and suggests that the Bank of Canada's efforts are likely to be rewarded with considerably lower inflation by 1992.

Outline of the Discussion

The implications of the monetarist view arise from insights described in detail in earlier C.D. Howe Institute publications[2] — insights stressing a long-run relationship between money growth and inflation, and a short-run relationship between fluctuations in money growth and fluctuations in output.

In the following pages, we first summarize these insights and interpret the current Canadian situation in their light. Second, we outline some reasons often advanced for de-emphasizing money growth, reasons resting on a view that money responds passively to changes in demand for it. Third, we present some preliminary evidence which seems to run counter to those reasons, and to favor the monetarist view. Finally, we sum up the implications of our argument for Canada's output and inflation prospects in the medium term.

What Is the Monetarist View?

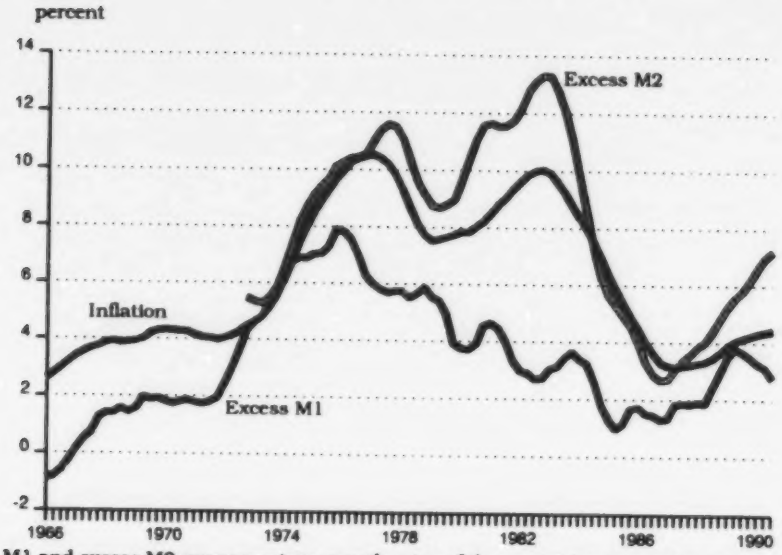
Money Growth and Inflation

A monetarist analysis of inflation starts with the proposition that if the quantity of money in circulation rises faster than the demand for it at a constant price level (which is dominated, in the long run, by the trend of real output), then the value of money must fall — or, in other words, the general price level must rise.

Figure 1

Excess Money and Inflation

(4-year averages of year-over-year changes)



Note: Excess M1 and excess M2 are percentage growth rates of the respective aggregates minus the percentage growth rate of real GDP. Inflation is measured as the percentage change in the GDP deflator.

Source for data: Bank of Canada; Statistics Canada.

In the complex Canadian financial system, money can be measured in a variety of ways. Two useful and representative measures are M1, consisting of currency outside banks plus demand deposits at chartered banks, and broader M2, which also includes a variety of interest-bearing time and savings deposits.

Whichever definition is used, the long-run path of Canadian inflation is associated with "excess" money growth, where "excess" is defined as "greater than real output growth" (see Figure 1). Excess M2 growth moves essentially simultaneously with inflation. Excess M1 growth is also systematically associated with changes in inflation; significantly, however, M1 tends to move in advance of inflation, with a lead averaging some two years.[3]

The M1 Gap and Output

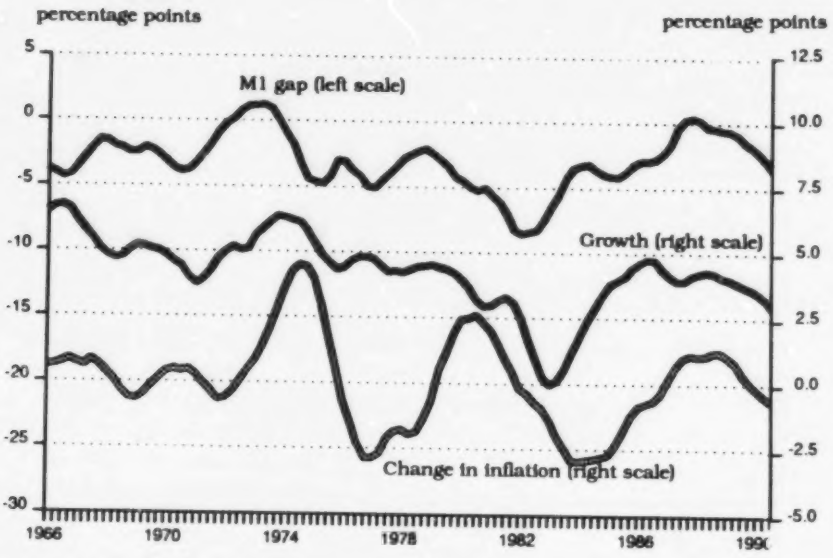
Over shorter periods, changes in money growth bring about changes in output growth. Again, the relationship between money supply and money demand is crucial.

In the short run, the economy's demand for nominal money grows with real output and the price level and, hence, with their product, nominal GDP. Over periods as short as a quarter, the behavior of these variables — prices, in particular — can be taken as largely predetermined. For this reason, the gap between growth in the money stock and growth in nominal GDP is a good short-run indicator of monetary conditions and the likely near-term path of output and employment.[4]

When the difference between growth in M1 and growth in nominal GDP — the "M1 gap" — is positive, liquidity is growing, prompting individuals and businesses to increase spending; when the M1 gap is negative, they tend to retrench. Changes in money growth thus affect spending and output first of all. In due course, variations in demand pressure influence prices: when demand falls, inflation eventually slows down, and vice versa.

Figure 2

The M1 Gap, Real GDP Growth, and Changes in Inflation



Note: The M1 gap and growth are 16-quarter weighted averages of, respectively, M1 growth minus nominal GDP growth, and real GDP growth (growth rates are year-over-year changes; the weights decline linearly from 16 for the current to 1 for the earliest observation). The change in inflation is the annual change in an 8-quarter average of year-over-year changes in the GDP deflator.

Source for data: Bank of Canada; Statistics Canada.

Figure 2 illustrates this sequence.[5] Variations in the M1 gap systematically lead output fluctuations by about three quarters, and output fluctuations precede variations in inflation by a further 12–18 months — evidence roughly consistent with the two-year lag between M1 growth and inflation displayed in Figure 1.

Other Influences on Output and Prices

Money growth is not, of course, the only source of fluctuations in the Canadian economy. Major world events, such as wars, can have pronounced impacts on Canada. Less dramatically, cycles in the economies of Canada's trading partners affecting Canadian exports can have important impacts on output. At the moment, tax changes may also be producing sharp swings in spending and production, a point elaborated later.

Similarly, various transitory factors — a one-time oil price increase, the introduction of the goods and services tax (GST) — can have direct effects on the price level. But the effect on inflation of such shocks is inherently short lived. In the long run, on average, inflation is mainly attributable to money growth.

A Monetarist View of Recent Events

From a monetarist perspective, the fact that the economy has been in recession since the spring of 1990 is not surprising. Inflationary pressures stemming from rapid monetary expansion in 1986–87 were still strong in 1989. During that year, however, the Bank of Canada's policies reduced M1 growth almost to a rate compatible with long-run price stability. As a result, with inflation (measured by the GDP deflator) averaging 4.9 percent in 1989, the M1 gap was persistently negative all year.

The high short-term interest rates and upward pressure on the exchange rate that attracted so much attention during 1989 and 1990 were symptomatic of a growing liquidity shortage. Though it was not possible to forecast definitely that output would shrink, a monetarist view made it clear that growth would slow as 1990 progressed, particularly when the weakness in M1 culminated in a dramatic fall that lasted through July.[6]

The Current Situation and Outlook

The monetarist view has implications for the economy's prospects over the next two years or so that differ from those suggested by the structural-eclectic view.

The Recession: How Long and How Deep?

The Structural-Eclectic View

The structural-eclectic view seems to judge the tightness of monetary policy by the level of interest rates — particularly those short-term rates that are most readily influenced by the Bank of Canada — and the exchange rate. Its implications for the current recession might be sketched out as follows.

High interest rates and a high dollar caused the economy to stall in early 1990. The recession continues to gather force, with declining profits and incomes causing declining investment and consumption, which in turn produce further profit and income declines in an ongoing vicious circle. Although interest rates have been falling since August, they have only recently dipped below the levels that prevailed at the beginning of 1990, when the economy was already weakening under their influence. Accordingly, the outlook is for continued economic contraction until more substantial interest-rate relief is provided.

The Monetarist View

The monetarist view considers the level of interest rates, taken in isolation, to be an unreliable indicator of monetary policy. Interest rate variations are a key channel through which monetary policy influences spending. What matters, however, is not their *absolute* level, but their level *relative* to the expectations of potential borrowers and lenders.[7]

Changing profit and income expectations on the part of businesses and households will affect their willingness to borrow at a given interest rate. To a business expecting a 15 percent rate of return on investment, a prime rate of 10 percent is low; but to a business expecting a 5 percent return, a 10 percent prime rate is high. Similarly, a household whose income prospects appear good will be more willing to borrow at 10 percent than one whose members fear for their jobs. Changing expectations on the part of potential creditors matter too: banks confident of the prospects for the economy will be more likely to lend at a given interest rate than banks that fear the impact of a downturn on the quality of their loans. In practice, such expectations cannot be observed directly; they can only be inferred from the behavior of borrowers and lenders.

Profit and income expectations of potential borrowers and lenders alike probably deteriorated rapidly as the economy slowed in the first half of 1990. The two-percentage-point rise in short-term interest rates that began early in the year thus constituted a more severe tightening of monetary conditions than its absolute size would suggest, a tightening whose extent is more accurately gauged by the accelerating decline in M1 that persisted through July.

Since August, M1 growth has picked up and the M1 gap has narrowed. If this tendency reflects a stabilization of income and profit expectations in the face of falling interest rates *and if it is sustained into 1991*, then the severity of the recession likely will be mitigated.

The Outlook for Inflation

The implications of these two views for inflation differ even more strikingly than their implications for near-term growth.

Each view sees the relationship between current activity and the economy's productive

capacity as an indicator of inflationary pressure. Thus, with the unemployment rate now over 9 percent (compared with estimates of a "non-accelerating inflation rate of unemployment" in the neighborhood of 7.5–8.0 percent) and capacity utilization down about 4 percentage points from its peak of 88.7 percent in the second quarter of 1988, both views currently see demand-side pressures as exercising a downward influence on inflation.

The Structural-Eclectic View

The structural-eclectic view, however, considers that there is a "cost-push" side to inflation strong enough to overwhelm the influence of weakening demand. Continued high wage settlements, the impact of the GST, and recent oil price increases seem to be key factors leading many forecasters to project CPI inflation to rise above 6 percent in 1991, and to come down only to the 4-percent-plus range in 1992.

The Monetarist View

From a monetarist standpoint, the recent weakness of demand in the economy is a reflection of the fact that, since early 1989, M1 growth has been slow enough to generate inflation closer to 2½ percent than 4½ percent in 1992. Even making allowance for the short-run impact of oil prices and the GST, inflation forecasts of 6-percent-plus for 1991 and 4-percent-plus for 1992 are difficult to reconcile with the behavior of M1.

Indeed, during the first seven months of 1990, monetary policy was probably tighter than needed to bring inflation down to the 2½ percent range; the past five months' rebound in M1 growth has merely begun to return it to a path consistent with the Bank of Canada's goal of long-term price stability.

These observations get support from data on M2. Figure 3 shows past growth patterns of both money measures.[8] As noted earlier, M2 growth tends to lag behind M1 growth when the stance of monetary policy changes.[9]

M2 growth remained relatively strong during 1989 despite the slowdown in M1, but it fell markedly as the recession took hold during 1990. The fact that M2 is behaving in accordance with past experience suggests that the messages conveyed by M1 during 1989 and 1990 should be taken seriously.

Credit Markets and Money Growth

The two views outlined here give different enough signals about the likely course of economic growth and inflation that it seems a matter of some importance to determine which of them is more likely to be reliable.

Demand and Supply Influences on Money Growth

As noted earlier, the structural-eclectic view is associated with the belief that, in a complex financial system like Canada's, growth in the monetary aggregates is mainly a passive response to variations, past and current, in factors determining growth in the demand for money — including real output growth and inflation. Accordingly, the behavior of the monetary aggregates has little, if any, significance for the future behavior of these factors.

In contrast, the monetarist view has it that money is created as a by-product of the credit-granting activities of the banking system and that, once created, it exerts an influence on the economy's demand for goods and services over and above — and indeed more important than — any first-round effects originating in credit markets. If this view is correct, the behavior of the monetary aggregates merits attention from forecasters and policymakers alike.

This is not the place to develop the detailed analysis needed to settle this issue. However, a "low-tech" look at Canadian data provides evidence consistent with the monetarist view. A more detailed (though still preliminary) analysis, which points in the same direction, is provided in the appendix.

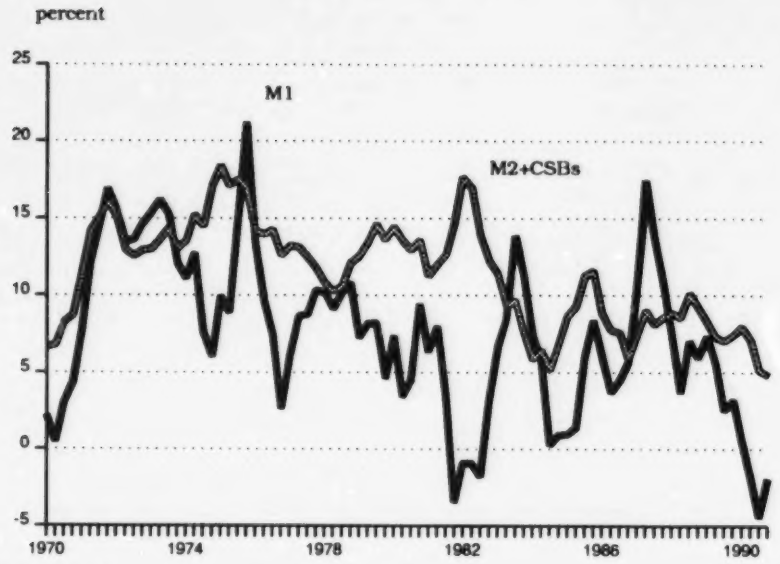
Growth of Credit and Money

In a simple textbook model of a financial system, it is uncontroversial that banks create

Figure 3

Growth of M1 and M2+CSBs

(year-over-year changes)



Source: Bank of Canada.

money as a by-product of their lending. Canada's financial system is much more complex than the textbook case, and it is harder to discern the links between bank lending and money creation. Nevertheless, if the monetarist view is valid, it should be possible to observe some systematic relationships between growth of bank loans and money.

In fact, Canadian data do suggest that growth of bank lending to persons (excluding mortgages) affects M1 growth. Lending to businesses, on the other hand, appears to affect the behavior of deposits included in M2, but not in M1. Since personal loans typically move ahead of business loans, reflecting the tendency of consumer spending to lead the business cycle and business investment to lag it, this relationship provides further insight into the tendency of M1 growth to lead M2 growth.

Figure 4 summarizes these relationships. It compares an index of relative growth rates of M1 and those components of broader money not included in M1 (M2+CSBs-M1) with an index of relative growth rates of bank lending to persons and bank lending to businesses. Clearly, these two relative growth rates are closely correlated.

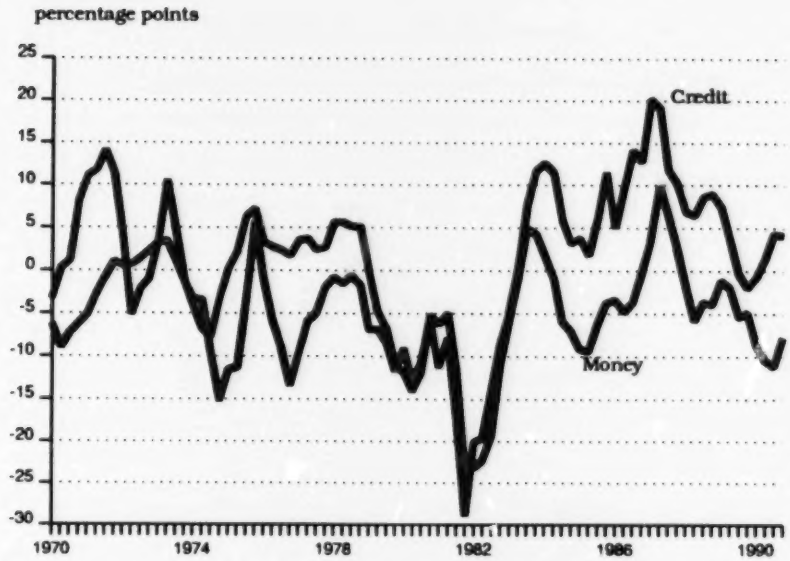
This correlation alone does not definitively disprove the view that money responds passively to variations in the demand for it. A much more thorough and sophisticated analysis would be required to rule out the possibility that both ratios were responding passively to some other common cause. Nevertheless, this correlation is consistent with the view that bank lending affects money growth in the Canadian financial system. Hence, it is also consistent with the view that current money supply growth has an important effect on the economy's subsequent performance.[10]

An Interpretation of Recent Monetary Data

If the growth of the various monetary aggregates does not simply reflect demand-side factors, but also reflects different types of bank

Figure 4

Relative Growth Indexes of Money and Credit



Note: The credit index is growth of personal bank loans minus growth of business bank loans (growth rates are year-over-year percentage changes). The money index is growth of M1 minus growth of M2+CSBs-M1.

Source for data: Bank of Canada.

lending, then the monetarist account of recent events given earlier may be elaborated along the following lines.

In early 1990, as expectations of households about their income prospects and of businesses about future profits deteriorated and as interest rates rose, bank borrowing by the more quickly reacting personal sector stagnated, particularly in the second quarter. This affected the behavior of demand deposits and, hence, the behavior of M1. The subsequent slower reaction of corporate sector borrowing then began to make its mark on M2.

In the last five months of 1990, falling interest rates, combined with a slower deterioration or levelling off in the economic outlook, halted — and perhaps even began to reverse — the downward spiral of money and credit, which earlier in the year was threatening to bring about a much more severe recession than now appears likely.

Some Concluding Comments

The Near-Term Outlook for Output

In suggesting that household and business perceptions of the economic outlook have become less gloomy in the past few months, we are conscious of being badly out of step with most observers. The consensus view has shifted very much toward pessimism since early 1990. Nevertheless, certain factors indicate that borrowers may be less pessimistic about near-term prospects than many commentators believe.

GST-Related Delays in Spending

The January 1, 1991 switch from the federal manufacturers sales tax (FST) to the GST has produced important changes in relative prices. Increases in prices of goods and services not previously subject to the FST have attracted

widespread attention. But from the point of view of spending patterns, the removal of the FST on consumer durables and, particularly, on investment goods is also highly significant.

The cost of consumer durables should have fallen somewhat with the switch to the GST. The effective cost of capital goods to businesses has fallen, on average, by a much larger amount, since GST paid on these items by firms is creditable against their own GST liabilities. Households and — much more so — firms have had a strong incentive to delay this type of purchase. This effect may have contributed to the economy's recent weakness; it will be reversed now that the GST is in place.

The Behavior of Inventories

When sales of goods fall off in a recession, inventories build up for a while, until output is adjusted to the newly depressed state of demand. When sales begin to pick up again, they do not translate into new production until excess inventories have been worked off. The higher the level of inventories during the early stages of a recession, therefore, the more prolonged the recession tends to be.

Inventories are now much lower relative to sales than they were at a comparable stage of the last recession. In the fourth quarter of 1981, two quarters into the 1981–82 slump, inventories (adjusted for inflation) averaged 21.5 percent of GDP, higher than they had been before the slowdown started. The current figure is 17.4 percent, down from 17.6 percent at the beginning of 1990. The inventory cycle therefore may be shorter and shallower this time round, and production may snap back more promptly when demand picks up.

Part of the run-down of inventories may also have been GST-related. For many firms, the federal government's rebate in respect of FST paid on inventories is less than the FST actually paid. These firms had an incentive to hold as little inventory of goods subject to the FST as possible on January 1. This consideration — which points to some restocking early this year — also suggests that the behavior of inventories may help to make this downturn less severe than the 1981–82 slump.

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Regional Variations in Economic Performance

A further reason for cautious optimism arises from Canada's continued wide variation in economic performance by region. It is now central Canada — the area where the inflationary tendencies of 1988 and 1989 were most pronounced — where the economy is weakest.

The West, where energy production, exports to overseas trading partners, and immigration continue to underpin the economy, and the Atlantic region, which for several years now has had more robust growth of output and employment than the country as a whole, are still providing support to the national economy to an extent that may not be readily apparent to many commentators in central Canada.

The Future of the Experiment

As we see it, Canada stands at a crucial stage in an experiment that is likely to provide a convincing demonstration of the relative merits of the structural-eclectic and monetarist views of the inflationary process.

If the structural-eclectic view underpinning many recent forecasts is right, a continuation of policy along the lines of the past year can be expected to produce a prolonged period of negative or very slow growth, and an inflation rate of some 6-percent-plus in 1991 and 4-percent-plus in 1992. If the monetarist view is right, recent evidence points tentatively to a shorter recession, and more firmly to an inflation rate closer to 2 percent than to 4 percent by the end of 1992.

Elsewhere, we have suggested that annual rates of expansion of about 3 percent for M1 and perhaps 5 percent for M2 are compatible with the Bank of Canada's long-run price stability target, which means, in practical terms, a rate of CPI inflation averaging a little under 2 percent annually. On this basis, monetary policy for the first three quarters of 1990 was too tight. It is now beginning to appear that — by encouraging renewed growth in M1 in recent months — the Bank is beginning to cut short a more extreme version of this experiment, a version which threatened a far harsher downturn than now appears likely.

We hope that this interpretation of recent data is correct, and that 1991 will see the maintenance of steady money growth in the above-mentioned ranges. If it does, then the falling inflation we expect ought to produce a continuing decline in interest rates, particularly at the short end of the spectrum — an easing which should pose no threat of a sustained resurgence of inflation.

If these hopes for 1991 are realized, it is possible that, by the end of 1992, the Bank of Canada will be seen to have fulfilled the promise of price stability and lower interest rates that it made when first it embarked on its much criticized — but in our view highly desirable — pursuit of "zero inflation".

Appendix

Links between Money and Credit in Canada

The difference between non-monetarist views (including the structural-eclectic view) and the monetarist view of the significance of the monetary aggregates' behavior arises from differing explanations of that behavior. Holders of non-monetarist views tend to believe that the aggregates respond passively to changes in demand for them. Monetarists allow also for the influence of lending activity, and argue that the quantity of money in circulation can differ from the quantity demanded, with consequences for future output and inflation.

This appendix begins by describing a simple "textbook" model of a financial system. It then offers a preliminary assessment of possible links, consistent with the monetarist position, between different types of lending and the creation of different types of money in the Canadian financial system.

A Simple Model of the Financial System

Money Creation and Control in the Simple Model

In a simple financial system, in which non-interest-bearing demand deposits were the banking system's only liability, those demand deposits and currency together would be the only kind of money. In such a system, the process of money creation would be transparent: deposits and, hence, money would be created every time the banks increased their lending to individuals and businesses.

In simple models, as in actual economies, banks hold reserves with the central bank against their deposit liabilities, in a ratio that may be legally stipulated and/or set at the discretion of the banks. With the central bank able to control this volume of reserves directly, it can also control indirectly the volume of bank lending and hence of deposits.

Growth of Credit and Money in the Simple Model

An increase in bank lending could be prompted by several factors — increased reserves made available by the central bank; increased deposits of currency by the public, which would add to reserves; or a change in the economic outlook leading to a decision to reduce reserve ratios (subject to any limits imposed by regulatory restrictions). Regardless of its source, the increase in lending would lead to an increase in the quantity of deposits and, hence, in the quantity of money.

This increase would have a direct first-round effect on demand in the economy, as borrowers used the proceeds of their new loans to purchase goods and services or other financial assets. And, more important, there would be second- and subsequent-round effects: the recipients of the newly created money, finding their liquidity increased, would be induced to increase their expenditure until the price level had been bid up to a level compatible with the new, higher quantity of money.

The Relevance of the Simple Model to Canada

This account of a simple textbook financial system is uncontroversial. There is, however, uncertainty and controversy about the extent to which it may be carried over to the actual, more complex, Canadian financial system.

It is still true that the banking system's total assets (mostly loans) and total liabilities (mostly deposits) must equal each other. But the significance of bank lending for the creation of a single measure of money, such as M1, is brought into question by the fact that chartered bank liabilities consist of a good deal more than demand deposits (which are in-

cluded in M1), and the related fact that holders of demand deposits can, if they wish, exchange them for other classes of deposits (which are not included in M1).

Non-Monetarist Views

Holders of non-monetarist views argue that the existence and easy availability of other types of deposits ensures that the quantity of demand deposits is determined by the public's willingness to hold them, and is therefore independent of the credit-market activities of the chartered banks in a way that it would not be in the simple model.

In this view, the behavior of M1 — of which demand deposits are the more volatile component — is also demand determined, varying in the same direction as real income and the general price level, and inversely with interest rates (because when rates are high it is costly to hold non-interest bearing deposits). It also implies that there is a significant random element to fluctuations in money holding.

The Monetarist View

The monetarist view, by contrast, holds that the simple model isolates important forces at work in the real world. While accepting that M1 demand is a function of real output, prices, and interest rates, this view rejects the notion that the quantity of M1 in circulation is determined only by demand.

If, as in the textbook model, there are supply-side influences at work, originating in the credit-granting activities of the chartered banks, the quantity of M1 in circulation may — and often will — differ from the quantity that the public wishes to hold. And this discrepancy will affect spending plans.

Links between Various Kinds of Credit and Money

Figure 4 showed a tendency for differences in growth rates of narrow and broad money to be mirrored by differences in growth rates of bank lending to persons and businesses. We are not aware of any research into the features of the Canadian financial system that might underlie this relationship. It is possible, however, to offer a preliminary hypothesis about what a more formal investigation might find.

Personal Loans and Demand Deposit Growth

It seems reasonable to suppose that persons — as well as the unincorporated or small businesses, mostly in the retail sector, with whom they carry out most of their daily transactions — keep a greater proportion of their liquid balances in currency and demand deposits than do larger firms, which have greater resources to devote to more sophisticated cash management. If this is so, variations in M1 and, more particularly, in its demand-deposit component might be expected to be correlated with changes in bank lending to the personal sector.[1] Moreover, fluctuations in these types of credit and money would be likely to occur early in the business cycle, reflecting the tendency of consumer spending — particularly on durables — to lead demand in general.

Business Loans and Broad Money Growth

Differences in sophistication in cash management would suggest that borrowing by larger firms, on the other hand, would likely be associated not with the growth of non- (or low-) interest-bearing demand deposits, but with the expansion of the interest-bearing deposits included in the broader monetary aggregates. These categories of credit and money, in turn, could be expected to fluctuate later on in the cycle, reflecting the tendency of business investment to lag the rest of the economy.[2]

A Preliminary Statistical Investigation

These suggestions outline some key features of a possible model of the Canadian financial

system that, to our knowledge, has not yet been constructed, and whose formal specification and testing are beyond the scope of this *Commentary*. Evidence that such a model-building exercise might prove fruitful can be found, however, in some rough-and-ready analysis of correlations between demand deposits and bank lending to persons on the one hand, and the components of M2 not included in M1 and bank lending to businesses on the other.

Our procedure is to begin with some simple, relatively uncontroversial, specifications of demand functions for different types of money, and then see whether the addition of the appropriate credit variable appears to add to their explanatory power. If it does, there is a strong suggestion that the behavior of money is subject to supply-side influences stemming from credit markets, over and above influences stemming from demand-for-money factors.

It is widely agreed that demand functions for various types of financial assets should be specified in real — that is, price level adjusted — terms. Such demand functions usually include a "scale variable", typically some measure of the economy's real output; and one or more "opportunity cost variables", typically including the rate of return on the assets in question (their "own rate of return") and the rate of return on alternative assets. It is also common to add the lagged value of the dependent variable to the right-hand side of the equation to capture the effects of costly portfolio adjustment.[3]

Significantly, if growth of demand deposits is modelled along the above lines and personal sector credit growth is then added to the equation, the latter variable comes in strongly, while still leaving room for demand-side factors. And when business credit growth is added to an equation that captures the effect of demand-side influences on those deposits included in M2 but excluded from M1, a similar result is obtained.

Table A–1 displays the results of modeling demand-deposit growth as a function of real GDP growth and changes in the rate of return on savings deposits, with a lagged dependent variable. The results show that the growth of personal sector credit and its acceleration may be added to the equation with statistically significant results. Figure A–1 shows actual and fitted values of demand deposits for the equation containing both credit growth terms.

Table A–2 contains the results of a similar exercise for savings deposits. Changes in real M2–M1 are modeled as a function of real GDP growth, changes in the rate of return on saving deposits and in the rate available on 90-day commercial paper, changes in the outstanding stock of CSBs, and a lagged dependent variable. Again, the addition of the growth of business loans produces statistically significant results. In this case, the acceleration of credit, although it takes a positive coefficient, is not statistically significant. Figure A–2 shows actual and fitted values for the equation containing both credit growth terms.

Canadian Data Are Compatible with the Monetarist View

The significance of these results lies in their compatibility with the view that the behavior of the monetary aggregates is affected by bank lending activities. To that extent, therefore, they are compatible with the monetarist view that money growth is of significance to the future outlook for real growth and inflation.

We do not claim that these results are definitive. The fact that they employ, as independent variables, credit-growth measures that are clearly determined within the financial system — and hence ought to be statistically modeled, rather than treated as exogenous — is only the most obvious reason why it would be inappropriate to do so. We present them rather as highly suggestive, and hope that they will provoke someone to undertake a deeper and more systematic study of the issues addressed here.

Errata:
These tables replace the ones printed on page 14.

Table A-1

Demand Deposit Equations

	Regression 1	Regression 2	Regression 3
Constant	-0.018	-0.023	-0.013
Lagged Demand Deposits	0.667	0.609	0.641
	(0.084)	(0.084)	(0.081)
Gross Domestic Product	0.470	0.223	-0.052
	(0.256)	(0.261)	(0.265)
Saving Deposit Rate	-1.208	-1.316	-1.125
	(0.176)	(0.173)	(0.177)
Personal Loans		0.225	0.227
		(0.080)	(0.077)
Acceleration of Personal Loans			0.512
			(0.171)
R^2	0.767	0.787	0.809

Table A-2

Saving Deposit (M2–M1) Equations

	Regression 1	Regression 2	Regression 3
Constant	0.023	0.031	0.032
Lagged Saving Deposits	0.612	0.432	0.421
	(0.064)	(0.085)	(0.087)
Gross Domestic Product	0.064	0.074	0.052
	(0.069)	(0.066)	(0.072)
Saving Deposit Rate	0.894	1.078	1.100
	(0.218)	(0.217)	(0.219)
90-Day Paper Rate	-0.666	-1.063	-1.111
	(0.201)	(0.232)	(0.241)
Canada Savings Bonds	-0.060	-0.099	-0.102
	(0.016)	(0.020)	(0.020)
Business Loans		0.095	0.098
		(0.032)	(0.032)
Acceleration of Business Loans			0.037
			(0.050)
R^2	0.836	0.853	0.854

Notes to Tables

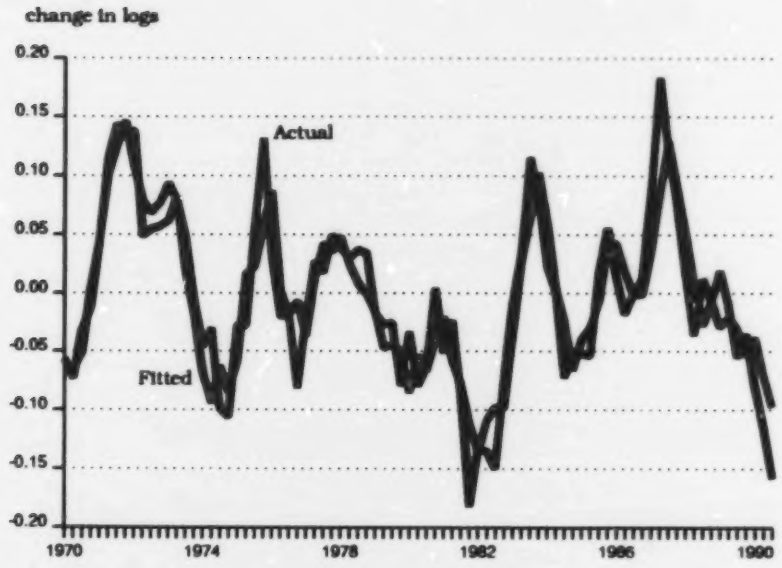
All variables except accelerations of credit are changes from the year-earlier quarter. Interest rates are expressed in percentage points; all other variables are changes in log levels of inflation-adjusted series (using the GDP deflator).

The interest-rate series are quarterly averages of month-end figures beginning with the last month of the previous quarter — for example, figures for the third quarter of 1990 are averages of month-end figures for June, July, and August. The credit series have been adjusted to remove the effects of a reclassification of personal to business loans in November 1981.

Equations were estimated by ordinary least squares over the period 1969:Q2 to 1990:Q3. Standard errors are shown in parentheses below the relevant coefficients.

Figure A–1

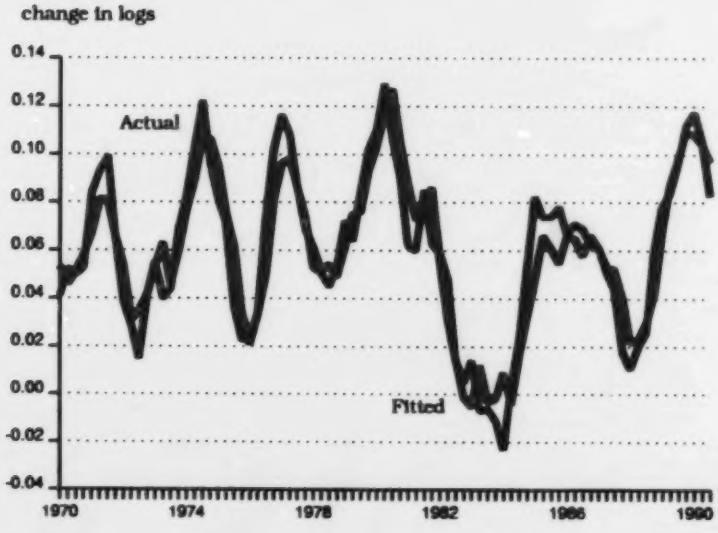
Real Demand Deposits: Actual and Fitted



Source: See Table A–1.

Figure A–2

Real M2–M1: Actual and Fitted



Source: See Table A–2.

Notes to Text

1 The "structural-eclectic view" represents a synthesis of what seems to be a widely held position. It is used as an expositional device, and is not meant to represent the position of any individual or forecasters generally. It is not a straw man, however: in a recent survey (Conference Board of Canada, *Survey of Forecasters*, December 28, 1990), 3 of 11 forecasters projected 1991 increases of 6.3 percent or more in the CPI and 5.1 percent or more in the GDP deflator. Of the 9 forecasters with projections for 1992, 3 forecast increases of 4 percent or more in both measures. A monetarist view leads to a lower expectation. There are other, non-mainstream positions, some of which — such as the belief that higher interest rates produce *higher* inflation — predict very different outcomes from any outlined here. Discussion is limited here to the two mainstream views, on the basis of their greater theoretical coherence and empirical support. Readers are invited, however, to make their own comparisons of the predictive power of alternative theories during the months ahead.

2 David Laidler and William Robson, *Mainly Money: The Cause of Canadian Inflation*, Inflation Monitor 4 (Toronto: C.D. Howe Institute, 1990); and William Robson, *Not-So-Fine Tuning: Bank of Canada Policy and Inflation since 1986*, Inflation Monitor 5 (Toronto: C.D. Howe Institute, 1990). See also David Laidler, "Monetary Policy Needs Fine Tuning," *Globe and Mail* (Toronto), August 10, 1990.

3 The link between M1 growth and inflation broke down in the early 1980s, when institutional changes in banking reduced d emand for non-interest-bearing demand deposits. This breakdown, which was decisive in persuading the Bank of Canada to abandon money-growth targeting, seems to have been temporary, with previous relationships reappearing in the mid-1980s.

4 Interest rates also exercise a systematic influence over money demand. That is why, when money growth slows relative to growth of money income, interest rates tend to rise as markets seek to restore equilibrium between money supply and money demand. Such changes in interest rates are one of the channels through which monetary policy influences demand in the economy.

5 The M1 gap and GDP growth are represented in Figure 2 by weighted moving averages to illustrate their correlation with changes in inflation. As we showed in *Mainly Money*, the link between the M1 gap and growth is visible in less aggregated data. However, the longer-term link between output growth and inflation is better illustrated with averages over several years.

6 For discussions of the likelihood of a real slowdown in 1990, see ibid., and Robson, *Not-So-Fine Tuning*.

7 Stable money growth policy may require large fluctuations in interest rates to accommodate such shifting expectations. See Peter Howitt, *A Skeptic's Guide to Canadian Monetary Policy*, C.D. Howe Institute Commentary 25 (Toronto: C.D. Howe Institute, 1990).

8 Because Canada Savings Bonds (CSBs) are a good substitute for some instruments included in M2, variations in the popularity of CSBs can distort M2 growth, particularly over short periods. To eliminate this effect, Figure 3 shows the behavior of M2 plus CSBs.

9 Many of the assets included in M2, but not in M1, bear interest at market-determined rates. When monetary policy tightens, and M1 growth slows, short-term interest rates rise. Individuals and businesses are induced to shift funds into interest-bearing M2 assets, and this demand-side effect keeps M2 growing for a time. There may, however, be more to this sequence than purely demand-side factors. Possible links to different types of bank lending are discussed in the next section and explored in more detail in the appendix.

10 Bank of Canada research suggests that shifts in money growth, including ones not attributable to factors influencing money demand, affect the subequent course of output and prices. See David Hostland, Stephen Poloz, and Paul Storer, *An Analysis of the Information Content of Alternative Monetary Aggregates*, Bank of Canada Technical Report 48 (Ottawa, 1988), Allan Crawford, "A Reconciliation of Dynamics in Money Demand and Indicator Models," and Patrice Muller, "The Information Content of Financial Aggregates During the 1980s" (papers presented at the Bank of Canada Monetary Seminar, Ottawa, May 1990). This evidence is hard to reconcile with the view that money growth responds passively to changes in money demand.

Notes to Appendix

1 The fact that credit card payments are typically credited to non-interest-bearing chequing accounts would also contribute to this relationship.

2 Such links between narrow money and consumer spending on the one hand and broad money and business investment on the other would be consistent with the results of Bank of Canada research into the indicator properties of the monetary aggregates. In the Bank's models, real M1 provides the most information about real consumption and real M2 the most about real investment. See Allan Crawford, "A Reconciliation of Dynamics in Money Demand and Indicator Models" (paper presented at the Bank of Canada Monetary Seminar, Ottawa, May 1990), pp. 10, 57–58.

3 We do not necessarily intend to indicate approval of this type of specification. It is, however, a commonly adopted one. See the extensive survey of empirical work on the demand for money in David Laidler, *The Demand for Money — Theories, Evidence and Problems*, 3rd ed. (New York: Harper Row, 1985).